CLAIMS

1. An image similarity calculation system comprising an image similarity calculation unit configured to:

5   use a probability model of a probability for an editing process to be applied to an image;

compare a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of an reference image; and

10   calculate an image similarity between the inquiry image and the reference image.

2. The image similarity calculation system according to claim 1, wherein

15   the probability model is determined for each region; and

the image similarity calculation unit is configured to use the probability model when comparing the feature quantity for each divided small region of the inquiry image and the feature quantity for each divided small region of the reference image.

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3. The image similarity calculation system according to claim 1, wherein the image similarity calculation unit is configured to use the probability model when calculating the image similarity between the inquiry image and the reference image.

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4. The image similarity calculation system according to claim 1, wherein

the probability model is determined for each region; and

the image similarity calculation unit is configured to use

30   the probability model when comparing the feature quantity for each divided small region of the inquiry image and the feature quantity for each divided small region of the reference image and when calculating the image similarity between the inquiry image and

the reference image.

5. An image similarity calculation system comprising an image similarity calculation unit configured to:

compare a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image, using an image-region-based weight value calculated based on a probability for an editing process to be applied to an image for each local region, and

calculate an image similarity between an inquiry image and a reference image.

6. An image similarity calculation system comprising an image similarity calculation unit configured to:

compare a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image so as to calculate an overall image's similarity;

modify the overall image's similarity by using a threshold value for determining a match between images, the threshold value being calculated based on a probability for a editing process to be applied to an image for each local region or based on a probability distribution of the number of local regions where an editing process is applied to an image; and

calculate an image similarity between the inquiry image and the reference image.

7. An image similarity calculation system comprising an image similarity calculation unit configured to:

compare a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image, using an image-region-based weight value calculated based on a probability for a editing process to

be applied an image for each local region so as to calculate an overall image's similarity;

modify the overall image's similarity using a threshold value for determining a match between images, the threshold value

5   being calculated based on a probability for an editing process to be applied an image for each local region; and

calculate an image similarity between the inquiry image and the reference image.

10   8.   The image similarity calculation system according to claim 5, further comprising:

editing probability calculation means configured to calculate a probability for an editing process to be applied to an image for each local region using a learning image or a device

15   characteristic, as the probability for the editing process to be applied to the image for each local region.

9.   The image similarity calculation system according to claim 5, further comprising:

20   editing probability calculation means configured to calculate a probability that an editing process was applied to an image for each local region using an edited inquiry image, as the probability for the editing process to be applied to the image for each local region.

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10.   The image similarity calculation system according to claim 6, further comprising:

editing probability distribution calculation means configured to calculate a probability for an editing process to

30   be applied to an image for each local region or a probability distribution of the number of local regions where an editing process is applied to an image, using a learning image or a device characteristic, as the probability for the editing process to be

applied to the image for each local region or the probability distribution of the number of local regions where an editing process is applied to an image.

5   11. The image similarity calculation system according to claim 6, further comprising:

editing probability calculation means configured to calculate a probability for an editing process to be applied to an image for each local region or probability distribution of the

10   number of local regions where an editing process is applied to an image using an edited inquiry image, as the probability for the editing process to be applied to the image for each local region or the probability distribution of the number of local regions where an editing process is applied to an image.

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12. The image similarity calculation system according to claim 7, further comprising:

editing probability calculation means configured to calculate a probability for an editing process to be applied to

20   an image for each local region using a learning image or a device characteristic, as the probability for the editing process to be applied to the image for each local region.

13. The image similarity calculation system according to

25   claim 7, further comprising:

editing probability calculation means configured to calculate a probability for an editing process to be applied to an image for each local region using an edited inquiry image, as the probability for the editing process to be applied to the image

30   for each local region.

14. An image similarity calculation system comprising:

editing probability model estimation means configured to

calculate, as a local region editing probability, a probability for an editing process to be applied to an image for each local region using a learning image or a device characteristic supplied as input;

5   local region weight calculation means configured to calculate a weight value for each local region in an image as a local region weight value based on the local region editing probability;

image division means configured to divide an edited inquiry
10   image supplied as input into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

15   small region similarity calculation means configured to compare a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity, and

20   calculate a similarity of feature quantities for respective small regions as a small region similarity; and

image similarity calculation means configured to calculate an image similarity between the inquiry image and the reference image by weighting the small region similarity using a
25   small-region-based weight value found from the local region weight value.

15. An image similarity calculation system comprising:

editing region detection means configured to calculate, as
30   a local region editing probability, a probability that an editing process was applied to an image for each local region using an edited inquiry image supplied as input;

a local region weight calculation means configured to

96

calculate a weight value for each local region in an image as a local region weight value based on the local region editing probability;

image division means configured to divide the inquiry image into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

small region similarity calculation means configured to compare a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity, and

calculate a similarity of feature quantities for respective small regions as a small region similarity; and

image similarity calculation means configured to calculate an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

16. An image similarity calculation system comprising:

editing probability model estimation means configured to calculate a local region editing probability or editing-targeted local region count probability distribution using a learning image or a device characteristic supplied as input, the local region editing probability being a probability for an editing process to be applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process is applied to an image;

match determination threshold calculation means configured

to calculate a threshold value for determining a match between images as a match determination threshold based on the local region editing probability or editing-targeted local region count probability distribution;

5   image division means configured to divide an edited inquiry image supplied as input into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature

10   quantity;

small region similarity calculation means configured to compare a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry

15   image small region feature quantity, and

calculate a similarity of feature quantities for respective small regions as a small region similarity; and

image similarity calculation means configured to calculate an overall image's similarity from the

20   small region similarity,

modify the overall image's similarity using the match determination threshold, and

calculate an image similarity between the inquiry image and the reference image.

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17.   An image similarity calculation system comprising:

editing region detection means configured to calculate a local region editing probability or editing-targeted local region count probability distribution using an edited inquiry image

30   supplied as input, the local region editing probability being a probability that an editing process was applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the

number of local regions where an editing process was applied to an image;

match determination threshold calculation means configured to calculate a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

image division means configured to divide the inquiry image into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

small region similarity calculation means configured to compare a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity, and

calculate a similarity of feature quantities for respective small regions as a small region similarity; and

image similarity calculation configured to

calculate an overall image's similarity from the small region similarity,

modify the similarity using the match determination threshold, and

calculate an image similarity between the inquiry image and the reference image.

18. The image similarity calculation system according to any one of claims 10, 11, 16, and 17, wherein the match determination threshold calculation means is configured to calculate an optimum value for the match determination threshold by estimating occurrence probability distribution of an overall

image's similarity found from a similarity for each small region in images between an edited image and an original image based on the local region editing probability or the editing-targeted local region count probability distribution.

19. The image similarity calculation system according to claim 12 or 13, wherein the match determination threshold calculation means is configured to calculate an optimum value for the match determination threshold by estimating an overall image's similarity based on a local region weight value, by using the local region weight value.

20. The image similarity calculation system according to any one of claims 8, 9, 12, 13, 14, 15, and 19, wherein the local region weight calculation means is configured to:

decrease the local region weight value when the local region editing probability is high; and

increase the local region weight value when local region editing probability is low.

21. The image similarity calculation system according to claim 20, wherein the local region weight calculation means is configured to calculate the local region weight value as a difference between 1 and the local region editing probability.

22. The image similarity calculation system according to any one of claims 8 to 13, wherein the editing probability calculation means is configured to calculate the local region editing probability by using a method of automatically detecting the edited region to specify the edited region.

23. The image similarity calculation system according to claim 14 or 16, wherein the editing probability model estimation

means is configured to calculate the local region editing probability by using a method of automatically detecting the edited region to specify the edited region.

5   24.   The image similarity calculation system according to claim 15 or 17, wherein the editing region detection means is configured to calculate the local region editing probability by using a method of automatically detecting the edited region to specify the edited region.

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        25.   The image similarity calculation system according to any one of claims 1 to 21, wherein the local region is a divided region so as to correspond to a small region in the inquiry image or the reference image.

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        26.   The image similarity calculation system according to any one of claims 1 to 21 and 25, wherein a small region in the inquiry image or the reference image is an equally sized rectangular region resulting from dividing an image.

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        27.   The image similarity calculation system according to any one of claims 1 to 21 and 25, wherein a small region in the inquiry image or the reference image is one of regions which are divided so as to be partially overlap with each other.

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        28.   The image similarity calculation system according to any one of claims 1 to 21 and 25, wherein a small region in the inquiry image or the reference image results from dividing only part of an image.

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        29.   The image similarity calculation system according to any one of claims 1 to 28, wherein the feature quantity is based on at least one of color information, edge information, texture

information, shape information, and motion information.

30. The image similarity calculation system according to any one of claims 1 to 28, wherein the feature quantity is at least one of an average value, a mode value, and a median value for color coordinates specified in color space systems such as RGB color space, HSV color space, YUV color space, YIQ color space, YCbCr color space, L*a*b* color space, and XYZ color space, and Dominant Color, Color Layout, Scalable Color, Color Structure, Edge Histogram, Homogeneous Texture, Texture Browsing, Contour Shape, and Shape 3D specified in international standard ISO/IEC15938-3.

31. The image similarity calculation system according to any one of claims 1 to 30, wherein the editing process corresponds to at least one of superposing a ticker on an image, superposing a caption on an image, superposing a character on an image, superposing an object on an image, partially cutting an image, partially cropping an image, partially mosaicking an image, and partially blurring an image.

32. An image retrieval system to retrieve images using an image similarity calculated in the image similarity calculation system according to any one of claims 1 to 13.

33. An image retrieval system comprising:
editing probability model estimation means configured to calculate a probability for an editing process to be applied to an image for each local region using learning image or a device characteristic supplied as input, as a local region editing probability;
local region weight calculation means configured to calculate a weight value for each local region in an image as a local region weight value based on the local region editing

102

probability;

image division means configured to divide an edited inquiry image supplied as input into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

reference image group small region feature quantity storage means configured to store small region feature quantities for respective reference images in a reference image group composed of a plurality of previously registered reference images;

small region similarity calculation means configured to compare a small region feature quantity of each reference image stored in the reference image group small region feature quantity storage means with the inquiry image small region feature quantity, and

calculate a similarity of small-region-based feature quantities for each reference image as a small region similarity;

image similarity calculation means configured to weight a small region similarity calculated by the small region similarity calculation means for each of the reference images using a small-region-based weight value found from the local region weight value, and

calculate an image similarity between the inquiry image and each reference image in the reference image group; and

retrieval result output means configured to output a retrieval result for the inquiry image from the reference image group based on the image similarity calculated by the image similarity calculation means for each reference image.

34. An image retrieval system comprising:

editing region detection means configured to calculate a probability that an editing process was applied to an image for

103

each local region as a local region editing probability, using an edited inquiry image supplied as input;

local region weight calculation means configured to calculate a weight value for each local region in an image as a local region weight value, based on the local region editing probability;

image division means configured to divide the inquiry image into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

reference image group small region feature quantity storage means configured to store small region feature quantities for respective reference images in a reference image group composed of a plurality of previously registered reference images;

small region similarity calculation means configured to

compare a small region feature quantity of each reference image stored in the reference image group small region feature quantity storage means with the inquiry image small region feature quantity, and

calculate a similarity of small-region-based feature quantities for each reference image as a small region similarity;

image similarity calculation means configured to

weight a small region similarity calculated by the small region similarity calculation means for each of the reference images using a small-region-based weight value found from the local region weight value, and

calculate an image similarity between the inquiry image and each reference image in the reference image group; and

retrieval result output means configured to output a retrieval result for the inquiry image from the reference image group based on the image similarity calculated by the image

104

similarity calculation means for each reference image.

35. An image retrieval system comprising:

editing probability model estimation means configured to calculate a local region editing probability or editing-targeted local region count probability distribution using a learning image or a device characteristic supplied as input, the local region editing probability being a probability for an editing process to be applied an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process is applied to an image;

match determination threshold calculation means configured to calculate a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

image division means configured to divide an edited inquiry image supplied as input into small regions;

small region feature quantity extraction means configured to extract a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

reference image group small region feature quantity storage means configured to store small region feature quantities for respective reference images in a reference image group composed of a plurality of previously registered reference images;

small region similarity calculation means configured to compare a small region feature quantity of each reference image in a reference image group stored in the reference image group small region feature quantity storage means with the inquiry image small region feature quantity, and

calculate a similarity of small-region-based feature

quantities for each reference image as a small region similarity;

        image similarity calculation means configured to

           calculate an overall image's similarity from the small region similarity for each of the reference images

5   calculated by the small region similarity calculation means,

           modify the similarity using the match determination threshold, and

           calculate an image similarity between the inquiry image and each reference image in the reference image group; and

10   retrieval result output means configured to output a retrieval result for the inquiry image from the reference image group based on the image similarity calculated by the image similarity calculation means for each reference image.

15   36. An image retrieval system comprising:

        editing region detection means configured to calculate a local region editing probability or editing-targeted local region count probability distribution using edited inquiry image supplied as input, the local region editing probability being a

20   probability that an editing process was applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process was applied to an image;

25   match determination threshold calculation means configured to calculate a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

30   image division means configured to divide the inquiry image into small regions;

        small region feature quantity extraction means configured to extract a feature quantity for each small region from the

divided small regions as an inquiry image small region feature quantity;

reference image group small region feature quantity storage means configured to store small region feature quantities for respective reference images in a reference image group composed of a plurality of previously registered reference images;

small region similarity calculation means configured to compare a small region feature quantity of each reference image in a reference image group stored in the reference image group small region feature quantity storage means with the inquiry image small region feature quantity, and calculate a similarity of small-region-based feature quantities for each reference image as a small region similarity;

image similarity calculation means configured to calculate an overall image's similarity from the small region similarity for each of the reference images calculated by the small region similarity calculation means, modify the similarity using the match determination threshold, and calculate an image similarity between the inquiry image and each reference image in the reference image group; and

retrieval result output means configured to output a retrieval result for the inquiry image from the reference image group based on an image similarity calculated by the image similarity calculation means for each reference image.

37. The image retrieval system according to claim 35 or 36, wherein the match determination threshold calculation means is configured to calculate an optimum value for the match determination threshold by estimating occurrence probability distribution of an overall image's similarity found from a similarity for each small region in images between an edited image and an original image based on the local region editing

107

probability or the editing-targeted local region count
probability distribution.

38. The image retrieval system according to claim 35 or
36, wherein the match determination threshold calculation means
is configured to calculate an optimum value for the match
determination threshold by estimating an overall image's
similarity based on the local region weight value, by using the
local region weight value.

39. The image retrieval system according to any one of
claims 33, 34, and 38, wherein the local region weight calculation
means is configured to decrease the local region weight value when
the local region editing probability is high, and to increase the
local region weight value when local region editing probability
is low.

40. The image retrieval system according to claim 39,
wherein the local region weight calculation means is configured
to calculate the local region weight value as a difference between
1 and the local region editing probability.

41. The image retrieval system according to claim 33 or
35, wherein the editing probability model estimation means is
configured to calculate the local region editing probability by
using a method of automatically detecting the edited region to
specify the edited region.

42. The image retrieval system according to claim 34 or
36, wherein the editing region detection means is configured to
calculate the local region editing probability by using a method
of automatically detecting the edited region to specify the edited
region.

43. The image retrieval system according to any one of claims 33 to 40, wherein the local region is a divided region so as to correspond to a small region in the inquiry image or the reference image.

44. The image retrieval system according to any one of claims 33 through 40 and 43, wherein a small region in the inquiry image or the reference image is an equally sized rectangular region resulting from dividing an image.

45. The image retrieval system according to any one of claims 33 to 40 and 43, wherein a small region in the inquiry image or the reference image is one of regions which are divided so as to be partially overlap with each other.

46. The image retrieval system according to any one of claims 33 to 40 and 43, wherein a small region in the inquiry image or the reference image results from dividing only part of an image.

47. The image retrieval system according to any one of claims 33 to 46, wherein the feature quantity is based on at least one of color information, edge information, texture information, shape information, and motion information.

48. The image retrieval system according to any one of claims 33 to 47, wherein the feature quantity is at least one of an average value, a mode value, and a median value for color coordinates specified in color space systems such as RGB color space, HSV color space, YUV color space, YIQ color space, YCbCr color space, L*a*b* color space, and XYZ color space, and Dominant Color, Color Layout, Scalable Color, Color Structure, Edge Histogram, Homogeneous Texture, Texture Browsing, Contour Shape,

and Shape 3D specified in international standard ISO/IEC15940-3.

49. The image retrieval system according to any one of claims 33 to 47, wherein the editing process corresponds to at least one of superposing a ticker on an image, superposing a caption on an image, superposing a character on an image, superposing an object on an image, partially cutting an image, partially cropping an image, partially mosaicking an image, and partially blurring an image.

50. An image retrieval system to output an image similar to an inquiry image from a plurality of reference images based on a calculated image similarity using an image similarity calculation system according to any one of claims 1 to 29.

51. An image similarity calculation method comprising the steps of:
using a probability model of a probability for an editing process to be applied to an image;
comparing a feature quantity for each divided small region of the inquiry image with a feature quantity for each divided small region of the reference image; and
calculating an image similarity between an inquiry image and an reference image.

52. An image similarity calculation method comprising the steps of:
comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image by using an image-region-based weight value calculated based on a probability for an editing process to be applied to an image; and
calculating an image similarity between an inquiry image

and an reference image.

53.   An image similarity calculation method comprising the steps of:

5   calculating an overall image's similarity by comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image;

modifying the similarity by using a threshold value for
10   determining a match between images, the threshold value being calculated based on a probability for an editing process to be applied to an image for each local region or based on probability distribution of the number of local regions where an editing process is applied to an image; and

15   calculating an image similarity between the inquiry image and the reference image.

54.   An image similarity calculation method comprising the steps of:

20   calculating an overall image's similarity by comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image by using an image-region-based weight value calculated based on a probability for an editing process to be
25   applied to an image for each local region;

modifying the similarity by using a threshold value for determining a match between images, the threshold value being calculated based on the probability of editing an image for each of the local regions; and

30   calculating an image similarity between the inquiry image and the reference image.

55.   An image similarity calculation method comprising the

steps of:

calculating a probability for an editing process to be applied to an image for each local region as a local region editing probability, using a learning image or a device characteristic

5   supplied as input;

calculating a weight value for each local region in the image as a local region weight value based on the local region editing probability;

dividing an edited inquiry image supplied as input into

10   small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity

15   that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for respective small regions as a small region similarity; and

20   calculating an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

25   56. An image similarity calculation method comprising the steps of:

calculating a probability that an editing process was applied to an image for each local region as a local region editing probability, using an edited inquiry image supplied as input;

30   calculating a weight value for each local region in an image as a local region weight value, based on the local region editing probability;

dividing the inquiry image into small regions;

112

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity

5   that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for respective small regions as a small region similarity; and

10   calculating an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

15   57.   An image similarity calculation method comprising the steps of:

calculating a local region editing probability or editing-targeted local region count probability distribution using a learning image or a device characteristic supplied as

20   input, the local region editing probability being a probability for an editing process to be applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process is applied to an image;

25   calculating a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

dividing an edited inquiry image supplied as input into

30   small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

5   calculating a similarity of feature quantities for respective small regions as a small region similarity;

calculating an overall image's similarity from the small region similarity;

modifying the overall image's similarity using the match

10   determination threshold; and

calculating an image similarity between the inquiry image and the reference image.

58.   An image similarity calculation method comprising the

15   steps of:

calculating a local region editing probability or editing-targeted local region count probability distribution using an edited inquiry image supplied as input, the local region editing probability being a probability that an editing process

20   was applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process was applied to an image;

calculating a threshold value for determining a match

25   between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

dividing the inquiry image into small regions;

extracting a feature quantity for each small region from

30   the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for

114

a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for respective small regions as a small region similarity;

5 calculating an overall image's similarity from the small region similarity;

modifying the overall image's similarity using the match determination threshold; and

calculating an image similarity between the inquiry image
10 and the reference image.

59. An image similarity calculation program for allowing a computer to perform a process of:

taking into account a probability model of a probability
15 for an editing process to be applied to an image;

comparing a feature quantity for each divided small region of the inquiry image with a feature quantity for each divided small region of the reference image; and

calculating an image similarity between an inquiry image
20 and an reference image.

60. An image similarity calculation program for allowing a computer to perform a process of:

comparing a feature quantity for each divided small region
25 of an inquiry image with a feature quantity for each divided small region of a reference image by using an image-region-based weight value calculated based on a probability for an editing process to be applied to an image; and

calculating an image similarity between an inquiry image
30 and an reference image.

61. An image similarity calculation program for allowing a computer to perform a process of:

calculating an overall image's similarity by comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image;

5   modifying the similarity by using a threshold value for determining a match between images, the threshold value being calculated based on a probability for an editing process to be applied to an image for each local region or based on probability distribution of the number of local regions where an editing

10   process is applied to an image; and

calculating an image similarity between the inquiry image and the reference image.

62.   An image similarity calculation program for allowing

15   a computer to perform the processes of:

calculating an overall.image's similarity by comparing a feature quantity for each divided small region of an inquiry image with a feature quantity for each divided small region of a reference image by using an image-region-based weight value

20   calculated based on a probability for an editing process to be applied to an image for each local region;

modifying the similarity by using a threshold value for determining a match between images, the threshold value being calculated based on the probability of editing an image for each

25   of the local regions; and

calculating an image similarity between the inquiry image and the reference image.

63.   An image similarity calculation program for allowing

30   a computer to perform the processes of:

calculating a probability for an editing process to be applied to an image for each local region as a local region editing probability, using a learning image or a device characteristic

116

supplied as input;

calculating a weight value for each local region in the image as a local region weight value based on the local region editing probability;

5   dividing an edited inquiry image supplied as input into small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

10   comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for 15 respective small regions as a small region similarity; and

calculating an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

20

64. An image similarity calculation program for allowing a computer to perform the processes of:

calculating a probability that an editing process was applied to an image for each local region as a local region editing 25 probability, using an edited inquiry image supplied as input;

calculating a weight value for each local region in an image as a local region weight value, based on the local region editing probability;

dividing the inquiry image into small regions;

30   extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity

that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for

5   respective small regions as a small region similarity; and

calculating an image similarity between the inquiry image and the reference image by weighting the small region similarity using a small-region-based weight value found from the local region weight value.

10

65.   An image similarity calculation program for allowing a computer to perform the processes of:

calculating a local region editing probability or editing-targeted local region count probability distribution

15   using a learning image or a device characteristic supplied as input, the local region editing probability being a probability for an editing process to be applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of

20   local regions where an editing process is applied to an image;

calculating a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

25   dividing an edited inquiry image supplied as input into small regions;

extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

30   comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for a reference image supplied as input with the inquiry image small region feature quantity;

118

calculating a similarity of feature quantities for respective small regions as a small region similarity;

calculating an overall image's similarity from the small region similarity;

5 modifying the overall image's similarity using the match determination threshold; and

calculating an image similarity between the inquiry image and the reference image.

10 66. An image similarity calculation program for allowing a computer to perform the processes of:

calculating a local region editing probability or editing-targeted local region count probability distribution using an edited inquiry image supplied as input, the local region

15 editing probability being a probability that an editing process was applied to an image for each local region, the editing-targeted local region count probability distribution being a probability distribution of the number of local regions where an editing process was applied to an image;

20 calculating a threshold value for determining a match between images as a match determination threshold, based on the local region editing probability or editing-targeted local region count probability distribution;

dividing the inquiry image into small regions;

25 extracting a feature quantity for each small region from the divided small regions as an inquiry image small region feature quantity;

comparing a reference image small region feature quantity that is a previously prepared small region feature quantity for

30 a reference image supplied as input with the inquiry image small region feature quantity;

calculating a similarity of feature quantities for respective small regions as a small region similarity;

calculating an overall image's similarity from the small region similarity;

modifying the overall image's similarity using the match determination threshold; and

5   calculating an image similarity between the inquiry image and the reference image.